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## PATENT SPECIFICATION

(22) Filed 1 July 1976

(31) Convention Application No. 50/084 707

(32) Filed 10 July 1975

(31) Convention Application No. 50/084 946

(32) Filed 11 July 1975 in

(21) Application No. 27466/76

(33) Japan (JP)

(44) Complete Specification published 5 Dec. 1979

(51) INT CL2 C07C 147/00; C07D 309/10, 317/24//A01N 9/14; A61K

(52) Index at acceptance

C2C 1472 1492 1672 200 20Y 215 220 227 22Y 246 247 253 25Y 292 29Y 304 305 30Y 342 34Y 360 361 362 364 366 367 368 36Y 373 37Y 394 397 39Y 463 464 552 571 581 583 60Y 612 613 628 62X 652 658 65X 672 771 772 801 805 80Y QT QU RD RE



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#### (54) SULFINYL COMPOUNDS AND PROCESSES FOR PREPARING SAME

(71) We, KAO SOAP COMPANY LIMITED, a Japanese Company, of 1,1-chome, Nihonbashi-Kayabacho, Chuo-ku, Tokyo, Japan, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following

The present invention relates to novel compounds which have an antibiotic function. More specifically, the present invention relates to derivatives of acrylic acid,

which derivatives have a sulfinyl group at the  $\beta$ -position of the acid.

Many problems arise when conventional antibiotic chemicals are used. A primary problem is that each of the known antibiotic chemicals can only be applied to a small group of systems or species of micro-organisms. Under the present circumstances, it is therefore necessary to subject a number of available antibiotic chemicals to various tests in order to select the specific chemical which is suited for application to the particular system or species of micro-organisms. Although antibiotic chemicals of the phenol system have been widely used, this kind of chemical, in general, has only a narrow spectrum of antibiotic activity and it must be used at a high concentration. Antibiotic chemicals of the halogen-substituted aromatic compound system, which are another kind of widely used antibiotic chemical, tend to accumulate in the natural world without being decomposed, which causes another kind of problem. It is also known that invert soaps exert remarkable antibiotic activities at low concentrations. However, it is difficult to apply invert soaps to a system in which it is desired to avoid lathering of the soaps or to an anionic emulsion system, because the invert soaps form insoluble complexes with such systems.

The present invention has been developed as a result of our vigorous efforts to solve the aforementioned problems.

The object of the present invention is to provide compounds which have an antibiotic function and which can be widely applied to various uses.

The present invention provides compounds having the following formula (1):

#### RSO-CH=CHX

(1)

In the above formula, R is alkyl or alkenyl having 1 to 20 carbon atoms, or aryl 30 30 such as aryl having 6 to 10 carbon atoms; and X is -COY, wherein Y is (1) -O(CH<sub>2</sub>CH<sub>2</sub>O)<sub>m</sub>H, wherein m is zero or an integer from 1 to 12, or (2) -OM, wherein M is an alkali metal, an alkaline earth metal or NH4, or (3) —O(CH<sub>2</sub>CH<sub>2</sub>O)<sub>m</sub>R<sub>1</sub>, wherein m is as defined above and R<sub>1</sub> is alkyl having 1 to 20 carbon atoms, or (4) a hydroxyl-substituted alkoxy group obtained by removing one 35 35 hydrogen atom from one hydroxyl group of a polyhydric aliphatic alochol or



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or (5) —NR'R", wherein R' is selected from hydrogen, alkyl having 1 to 20 carbon atoms, and hydroxyalkyl having 2 to 6 carbon atoms, and R" is selected from hydrogen, alkyl having 1 to 20 carbon atoms, and substituted alkyl having 2 to 6 carbon atoms wherein the substituent is selected from hydroxyl and a sulfo group in the form of a salt (— $SO_3M_1$ , wherein  $M_1$  is an alkali metal).

Preferably R is a straight chain alkyl or alkenyl group having 3 to 18 carbon atoms; Y is preferably selected from alkoxy having 1 to 3 carbon atoms, alkoxyethoxy having 1 to 3 carbon atoms in the alkyl moiety —O(CH<sub>2</sub>CH<sub>2</sub>O)<sub>2</sub>R' where R' is alkyl having 1 to 3 carbon atoms,

$$-O(CH_2CH_2O)_mH (m=1 \text{ to } 12),$$

and where Y is —NR'R", R' is preferably selected from hydrogen, alkyl having 1 to 3 carbon atoms, and hydroxyalkyl group having 2 or 3 carbon atoms; and R" is selected from hydrogen, alkyl having 1 to 3 carbon atoms, hydroxyalkyl having 2 or 3 carbon atoms, and substituted alkyl group having 2 or 3 carbon atoms and wherein the substituent is —SO<sub>3</sub>M wherein M is an alkali metal.

The compounds having the above formula (1) can be obtained by oxidizing compounds having the formula (2) with an inorganic or organic peroxide.

$$RS-CH=CHX$$
 (2)

wherein R and X in the formula (2) are the same as defined hereinabove with reference to the formula (1).

The formula (2) starting compounds and their preparation are disclosed and claimed in British Patent Application No. 26353/76 (Serial No. 1 528 853).

Examples of inorganic peroxides usable in the method described above include hydrogen peroxide and sodium metaperiodate. As suitable organic peroxides, there are mentioned m-chloro-perbenzoic acid, perbenzoic acid and peracetic acid.

It is preferred to use 1.1 to 1.5 moles of the peroxide per 1 mole of the starting compound of formula (2).

The solvent used in the reaction mixture and the time period for carrying out the reaction can be determined depending on the kind of oxidizing agent that is used. In general, the oxidizing reaction of the invention is carried out in a solvent such as a hydrated alcohol, acetic acid or a chlorinated hydrocarbon such as chloroform or methylene chloride, at a temperature of  $-10^{\circ}$ C to 80°C. More specifically, when sodium metaperiodate is used, the reaction is carried out in a hydrated alcohol at 0° to 25°C; when hydrogen peroxide is used, the reaction is carried out in a hydrated alcohol at 60° to 70°C or in acetic acid at 30° to 80°C; when m-chloro-perbenzoic acid or perbenzoic acid is used, the reaction is carried out in a chlorinated hydrocarbon such as chloroform or methylene chloride at 0° to 25°C; and when peracetic acid is used, the reaction is carried out in acetic acid at  $-10^{\circ}$  to 0°C.

The compounds having the formula (2) which are used as starting materials for preparing the compounds of the present invention having the formula (1), can be prepared by the method of reacting mercaptans having the formula RSH (3) with acetylene-monocarboxylic acid in an aqueous solution of an alkali metal hydroxide to form compounds having the formula (4):

### RS-CH=CH-COOM

(4)

wherein R is as defined above and M is hydrogen or alkali metal. The compounds obtained by esterifying or forming amides of the compounds having the formula (4) can also be used as starting materials for preparing the compounds of the present invention.

Among the groups represented by —COY for X in the compounds of the formula (2) and used as starting materials for the compounds of the invention, hydroxyl-substituted alkoxy groups are formed by removing one hydrogen atom from one hydroxyl group of a polyfunctional alcohol, especially a saturated, aliphatic or alicyclic alcohol having from 2 to 10 carbon atoms. The cyclic groups

having ether bonds located in the ring, can also be used. Such alkoxy groups are formed by removing one hydrogen atom from one hydroxyl group of a polyfunctional alcohol such as ethylene glycol, propylene glycol, glycerin, erythritol, pentaerythritol, xylitol, sorbitol, mannitol, diglycerin, dipentaerythritol, xylitan, sorbitan, mannitan and polyethylene glycols.

The compounds of the present invention have the formula (1) are used for germicides or sterilizers other than for medical uses, and also as antifungal agents, and antiseptics. The compounds of the present invention prevent growth of Gram positive organisms such as Staphylococcus aureus and Bacillus subtilis which are representative micro-organisms that cause various injuries under normal living environments, and also prevent growth of the Gram negative organisms such as Escherichia coli, Proteus vulgaris and Pseudomonas including Pseudomonas aeruginosa which is well known as a representative putrefactive bacterium. The compounds of the invention also have the function of preventing growth of various molds such as Penicillium, Aspergillus and Sozopus and are further effective against yeasts belonging to the Candida genus which causes moniliasis.

The compounds of the present invention can be changed in their physiochemical properties and their antibiotic activities by introducing different groups R and X into

Various esters of  $\beta$ -mercapto-acrylic acids were synthesized. The conditions and

yields of the reactions are shown in Table 1, and the properties of the products are

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shown in Table 2.

TABLE 1
Preparation of esters of \(\beta\)-mercapto acrylic acids

Yield based on mercapto acrylic acid	76	89	84	84	78	80
Product	C,, H,, S-CH - CH-COOCH,	он он           	C12H2S SCH-CHC00-CH2F	HO HO HO HO HO PHO S 24 25	С., н., SCH - СНСОО(СН, СН,О), СН,	CH, SCH - CHCOOCH,
Reaction period (hr)	'n	8	'n		ς,	5
Reaction Reaction temp. period (°C) (hr)	80	110	110		80	08
Solvent	benzene (400m)	toluene (400m)	toluene (400m)		benzene (400m)	benzene (400m)
Quantity of the catalyst	5m1	10 g	10 в		Sml	5m1
.f Cataly st	H, 50,	Amberlite* IR120	Amberlite IR-120		н, ∞,	H <sub>2</sub> SO,
Quantity of alcohol in mol added to 0.30 mol of mercap to acrylic acid	3.0	2.0	3.0 20H		2.0	3.0
Radical of alcohol deprived of one OH group	œ,	он-он      -   -Сн, Сн-Сн,	он    - -сн, <del>(</del> -сн. <del>),</del> сн,он		–(СН, СН,О), СН,	CH,
R in β- mercapto acrylic acid	C12 H28					£

\* 'Amberlite' is a Regd. Trade Mark.

TABLE 1 (Continued)

			TABLE 1 (Continued) Preparation os esters of $oldsymbol{eta}$ -mercapto acrylic acids	TABI os esters	TABLE 1 (Continued) sters of <i>B</i> -mercapto ac	tinued) pto acryli	c acids		
R in β- mercapto acrylic acid	Radical of alcohol deprived of one OH group	Quantity of alcohol in mol added to 0:30 mol of mercapto acrylic acid	Catalyst	Quantity of the catalyst	Solvent	Reaction temp.	Reaction Reaction temp. period (°C) (hr)	on Product	Yield based on mercapto acrylic acid
	OH OH      - CH, CH—CH,	2.0	Amberlite IR-120	10 g	toluene (400m)	110	8	OH OH           CH, SCH = CHCOOCH, CH-CH,	76
	он    -сн, ←сн, сн, он	3.0	Amberlite IR-120	10 g	toluene (400m)	110	'n	но но он о	32
								· HO HO HO - HO - HO - HO - HO - HO - HO	33
	-(сн, сн, о), сн,	2.0	H, SO,	Sml	benzene (400m)	80	8	СН, SCH « СНСОО(СН, СН,О), СН,	89
C20H41	CH,	3.0	H, SO,	Smi	benzene (400m)	80	'n	C20 H41 SCH = CHC00CH3	7.5
	0H 0H      -CH,-CH-CH,	2.0	Amberlite IR—120	10 g	toluene (400m)	110	S	OH OH                 	09

TABLE 1 (Continued)

Preparation of esters of  $oldsymbol{eta}$ -mercapto acrylic acids

Yield based on mercapto acrylic acid		он он 1, СН <sub>2</sub> 0), СН <sub>3</sub> 82	78	OH OH 68 	<b>8</b> 8	2°CH OH OH 36
Product	HO HO HO HO HO HO HO HO HO HO HO HO HO H	94 04 CHCOO(CH, CH,0), CH,	C, H, SCH = CHCOOCH,	OH OH           C <sub>1,</sub> H <sub>3,</sub> SCH - CHCOOCH <sub>2</sub> CH-CH <sub>2</sub>	-с <sub>18</sub> н <sub>35</sub> scн-сисоосн <sub>2</sub> -	с <sub>в</sub> 35 <sup>5</sup> Сн−снсоосн <sub>7</sub> сн-
Reaction period (hr)	<b>v</b> s	۸,	ν,	'n	S	
Reaction temp.		80	80	110	110	
Solvent	toluene (400m)	benzene (400m)	benzene (400m)	toluëne (400m)	toluene (400m)	
Quantity of the catalyst	10 g	5ml	5ml	. 10 g	10 g	
Cataly st	Amberlite IR-120	H, 50,	H <sub>2</sub> SO <sub>4</sub>	Amberlite IR-120	Amberlite IR-120	
Quantity of alcohol in mol added to 0.30 mol of mercapto accylic acid	3.0	2.0	3.0	2.0	3.0	
Radical of alcohol redeprived of one a	он    -сн., -(-сн.), сн., он	-(CH, CH,0), CH,	CH3	он он       -сн, сн-сн,	OH   	
R in $eta$ -mercapto acrylic acid			Oleyl (C <sub>10</sub> H <sub>15</sub> )			Ų,

	Yield based on mercapto acrylic acid	72	80	78	30	69
	Product	C <sub>16</sub> H <sub>#S</sub> SCH = CHCOO(CH <sub>2</sub> CH <sub>2</sub> O) <sub>2</sub> CH <sub>3</sub>	PhSCH = CHCOOCH,	0H 0H       PhSCH - CHCOOCH, CH-CH,	PhSCH-CHC00CH2 CH HO HO	PhSCH - CHC00(CH, CH, 0), CH,
c acds	Reaction period (hr)	8	\$	'n	'n	'n
IABLE 1 (Continued) sters of $eta$ -mercap to acrylic acds	Reaction temp.	80	80	110	110	.
β-merca	Solvent	benzene (400m)	benzene (400m)	toluene (400m)	toluene (400m)	benzene
of esters o	Quantity of the catalyst	5ml.	Sml	10 8	10 g	Sml
Preparation of esters of	Cata]yst	H, SO,	H2 SO4	Amberlite IR-120	Amberlite IR-120	H, 50,
	Quantity of alcohol in mol added ro 0.30 mol of mercapto acrylic acid	2.0	3.0	2.0	3.0	2.0
	Radical of alcohol deprived of one OH group	-(CH <sub>2</sub> CH <sub>2</sub> 0) <sub>2</sub> CH <sub>3</sub>	CH,	) он он        -СH, CHСH,	он    -сн, -(-сн-), сн, он	-(CH <sub>2</sub> CH <sub>2</sub> 0) <sub>2</sub> CH <sub>3</sub>
	R in β- mercapto acrylic acid		Phenyl	0		

TABLE 2

				Result	of elem	Result of elementary analysis	ınalysi
Compound	Property	IR (cm-1)	NMR (CCI,, TMS, 8 ppm)	C (%) H	C (%) H (%)	ca C(%)	H (%)
C <sub>12</sub> H <sub>25</sub> S-CH <b>-</b> CH-C00CH,	mp. 48-50°C (from hexane)	17 10 (C=0)	7.55 (doublet, 1H, "CH-COO-), 5.80 (doublet, 1H, -S-CH-)	67.2	10.4	67.1	10.6
он он             С <sub>12</sub> H <sub>2</sub> , S-CH <b>-</b> CH-CH <sub>2</sub>	liquid	3300 (OH) 1715 (C-=O)	7.34 (doublet, 1H, = CH-COO-), 5.75 (doublet, 1H, -S-CH=)	62.3	10.3	62.4	10.0
но но но но но но но но но но но но но н	mp. 43-46°C (from hexane)	3300 (-OH) 1710 (C-O)	7.38 (doublet, IH, - CH-COO-), 5.81 (doublet, IH, -S-CH =)	62.4	9.3	62.7	9.5
но но но он сон-сон-сон-сон-ба-кд-2-су-4-су-4-су-4-су-4-су-4-су-4-су-4-су	mp. 45–47°C (from hexane)	3300 (-0H) 1713 (C-0)	7.39 (doublet, 1H, "CH_COO-), 5.78 (doublet, 1H, _S_CH=)	62.1	9.4	62.7	. 9.5
C,, H,,s S-CH - CH-C00(CH, CH,0), CH,	liquid	3300 (OH) 1710 (CO)	7.40 (doublet, IH, = CH-COO-), 5.80 (doublet, IH, -S-CH=)	63.9	10.3	64.1	10.2
сн, scн - снсоосн,	liquid	1712 (C-0)	7.40 (doublet, 1H, -CH-COO-), 5.92 (doublet, 1H, -S-CH =)	45.3	5.9	45.5	6.1

		TABLE 2 (Cor	2 (Continued)				
	Properties of e	sters of <i>B</i> -merca	Properties of esters of B-mercapto acrylic acids				
Compound	Property	IR (cm <sup>-1</sup> )	NMR(CCI₄, TMS, δ ppm)	Resulto four C(%)	ultof eler found %) H(%)	nentary analy calcd C(%) H(%)	Result of elementary analysis found calcd C(%) H(%) C(%) H(%)
онон 	liquid	3300 (OH) 1715 (C-OL	7.36 (doublet, 1H, -CH-COO-), 5.70 (doublet, 1H, -S-CH-)	44.2	6.3	43.8	6.3
CH3 SCH= CHC00CH2 OH OH OH	liquid	3300 (OH) 1710 (C-O)	7.41 (doublet, 1H, = CH-COO-), 5.78 (doublet, 1H, -S-CH-)	45.6	6.0	45.5	6.1
CH 3 SCH-CHCOOCH2CH-COHO OH OH	liquid	3300 (OH) 17 14 (C=0)	7.38 (doublet, 1H, -CH-COO-), 5.70 (doublet, 1H, -S-CH-)	45.3	6.0	6.0 45.5	6.1
CH, SCH - CHCOO(CH, CH, 0), CH,	liguid	1710 (C-O)	7.63 (doublet, 1H, = CH-COO-), 5.62 (doublet, 1H, -S-CH=)	49.3	7.1	49.1	7.3
C20 H41 SCH = CHCOOCH3	mp. 4041°C (from hexane)	1715 (C=0)	7.36 (doublet, 1H, •CH-COO-), 5.62 (doublet, 1H, -S-CH =)	72.1	11.3 72.3	72.3	11.6
онон 	mp. 43.–44°C (from hexane)	3300 (OH) 1715 (C=0)	7.40 (doublet, 1H, *CH_COO_), 5.70 (doublet, 1H, -S-CH *)	68.4	10.8	68.1	11.0

65.3 10.2 65.6 10.3

7.20 (doublet, IH, = CH-COO-), 5.72 (doublet, IH, -S-CH =)

3300 (OH) 1714 (C-0)

mp. 53-54°C (from hexane)

HO HO SCH-CHCOOCH2CH CO

		Result of elementary analysis found calcd C(%) H(%) C(%) H(%)	65.4 10.3 65.6 10.3
inued)	Properties of esters of A-mercapto acrylic acids	NMR (CCl₄, TMS, 8 ppm)	7.42 (doublet, 1H, -CH-COO-), 5.36 (doublet, 1H, -S-CH-)
TABLE 2 (Continued)	ters of $eta$ -merca	IR (cm <sup>-1</sup> )	3300 (OH) 1710 (C-O)
	Properties of es	Property	m.p. 50-51°C (from hexane)
		Compound	он он он он он он он

1710 (C=O) 7.39 (doublet, IH, -CH-COO-), 5.29 (doublet, IH, -S-CH=)
3300 (OH) 7.62 (doublet, 1H, = CH-COO-), 1710 (C-O) 5.43 (doublet, 1H, -S-CH-)
1
3300 (OH) 7.37 (doublet, 1H, = CHCOO), 1710 (C=0) 5.40 (doublet, 1H, -SCH =)

TABLE 2 (Continued)

	Properties of	TABLE 2 (Continued) Properties of esters of $eta$ -mercapto acrylic acids	tinued) 2to acrylic acids				
Compound	Property	IR(cm*¹)	NMR (CCI4, TMS, 8 ppm)	Resultof elementary analysis found calcd C(%) H(%) C(%) H(%)	eleme nd H (%)	entary analys calcd C(%) H(%)	nalysis d H (%)
PhSCH - CHCOO(CH, CH,0), CH,	liquid	1710 (C=0)	7.36 (doublet, 1H, -CH-COO-) 5.42 (doublet, 1H, -S-CH-)	59.7	6.4	6.4 59.6	6.4
	0.33 mol of sodium met	Example 1.	Example 1. 0.33 mol of sodium metaperiodate (NaIO <sub>4</sub> ) was dissolved in a mixed solvent				
cor 5 acc mi	containing 200 ml of H <sub>2</sub> O as acrylic acid was added to thinkture at 25°C for 24 hour. The filtrate was extracted with	nd 200 ml of Meche solution at roo s, the formed sodium diethyl ether. A	containing 200 ml of H <sub>2</sub> O and 200 ml of MeOH. 0.30 mol of $\beta$ -lauryl-mercaptoacrylic acid was added to the solution at room temperature. After agitating the mixture at 25°C for 24 hours, the formed sodium iodate (NaIO <sub>3</sub> ) was filtered off. The filtrate was extracted with diethyl ether. A crystallized compound was obtained	<b>ທ</b> .			
for 10	at a yield of 80%. The results of the aliasy forth below.  Melting Point: 62—65°C (from hexane) IR (cm <sup>-1</sup> ): 3300 (OH),	(from hexane)	yield of 08%. The results of the alialyses of the crystallized compound are seedled.  Melting Point: 62—65%C (from hexane)  IR (cm <sup>-1</sup> ): 3300 (OH),	10	•		
	0=001	Ĵ					
	1050 (S=O)						
	NMR (CC1, TMS): 7.25 (doubler, 1H, =CH-COO-), 6.60 ppm (doublet, 1H,	5 (doubler, 1H, =C) ppm (doublet, 1H	H-C00-),				
	°=¶	-CH=).					
15	Result of the elementary analysis:  C (%) 62.4 62.7  H (%) 7.3 7.5	analysis: calcd. 62.7 7.5		15			

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From the results of the above analyses, the above crystallized compound was identified as having the following structural formula:

Example 2.

0.30 mol of β-lauryl-mercapto-acrylic acid was dissolved in 300 ml of EtOH.

0.50 mol of hydrogen peroxide in the form of a 30% aqueous solution was added and the mixture was heated at 70°C for 48 hours under agitation. The reaction mixture was extracted with diethyl ether to obtain a crystallized compound (yield: 68%). The results of the analytical tests confirmed that the crystallized compound obtained in this Example was the same as that of Example 1.

Example 3.

0.30 mol of  $\beta$ -lauryl-mercapto-acrylic acid was dissolved in 200 ml of chloroform. 0.33 mol of m-chloroperbenzoic acid in 100 ml of chloroform was added to the solution at 25°C. After agitating the mixture for 1 hour, the reaction product was extracted with diethyl ether. A crystallized compound was obtained (yield: 90%). The results of the analytical tests confirmed that the crystallized compound obtained in this Example was the same as that of Example 1.

Example 4.

0.30 mol of β-lauryl-mercapto-acrylic acid was dissolved in 200 ml of AcOH.
0.30 mol of peracetic acid was added to the solution at -10°C, and the mixture was agitated for 1 hour. Water was poured into the reaction mixture and the reaction product was extracted with diethyl ether. A crystallized compound was obtained (yield: 70%). The results of the analytical tests confirmed that the crystallized compound obtained in this Example was the same as that of Example 1.

Example 5.

Various  $\beta$ -sulfinyl-acrylic acids, esters thereof and amides thereof were synthesized. The reaction conditions and the yields are set forth in the following Table 7, and the properties of the obtained products are set forth in Table 8.

TABLE 7

	Preparat	reparation of $eta$ -sulfinyl acrylic acids and esters and amides thereof	acrylic acid	acids and esters and	amides the	reof		
 റ	Compound (2)	Oxidizing agent	Quantity of oxidizing agent in moles added of the Compound (2)	f ed is Solvent	Reaction period (hr.)	Reation temp.	Yield (based on compound (2), (%)	Product
-C <sub>12</sub> H <sub>25</sub>	c	NaIO,	0.33	MeOH(200ml)— H <sub>2</sub> O(200ml)	24	25	88 80	0=
	-C-OH	H,0,	0.50	EtOH(300ml)	48	80	89	C <sub>13</sub> H <sub>28</sub> –S–CH= CH–COOH
		HO 000 (O)	0.33	CHC1, (300ml)	-	25	06	
		сн, сооон						
			0.30	AcOH(200ml)	1	-10	70	
	0 	NaIO,	0.33	MeOH(200ml)— H <sub>2</sub> 9(200ml)	24	25	79	0=
		H, 0,	0.50	EtOH(300ml)	. 84	80	52	C <sub>12</sub> H <sub>36</sub> -S-CH=
		HO 000 (C)	0.33	CHCl, (300ml)	FT.	25	92	CH-C00Me
		СН, СОООН	0.30	AcOH(200ml)	1	-10	64	

			TABLE	TABLE 7 (Continued)				
	Pr	Preparation of $oldsymbol{eta}$ -sulfinyl actylic acids and esters and amides thereof	finyl acrylic	acids and esters	and amides	thereof		
ж ::	Compound (2) X:	Oxidizing agent	Quantity of oxidizing agent in moles added to 0.30 mols of the Compound (2)	ed 1s Solvent	Reaction period (hr.)	Reaction temp.	Yield (based on compound (2), (%)	Product
	0 OH OH        -COCH,-CH-CH,	Nai0,	0.33	MeOH(200ml)— H <sub>2</sub> O(200ml)	24	25	88	0=
		H,0,	0.50	EtOH(300ml)	84	80	76	  C <sub>12</sub> H <sub>28</sub> -S-CH=
			-		·			он он         СН—СООСН,—СН—СН,
	o-	NaIO.	0.33	MeOH(200ml)— H <sub>2</sub> O(200ml)	24	25	74	0=
	±5 ±5 ±5 ±5 ±5 ±5 ±5 ±5 ±5 ±5 ±5 ±5 ±5 ±	H, 0,	0.50	EtOH(300ml)	48	08	89	$C_{12}H_{28}-S-CH=$ $CHCOOCH_{2} O$ $HO OH$
	0     -  -	NaIO,	0.33	MeOH(200ml)— H <sub>2</sub> O(200ml)	24	25	91	0:
·		H, 0,	0.50	EtOH(300ml)	48	80	59	C <sub>12</sub> H <sub>26</sub> -S-CH = CH-COO(CH <sub>2</sub> CH <sub>2</sub> O) <sub>3</sub> H

TABLE 7 (Continued)

			TABLE	TABLE 7 (Continued)				
		Preparation of \( \beta\)-sulfinyl acrylic acids and esters and amides thereof	finyl acrylic	acids and esters	and amide	thereof		
ä	Compound (2)	Oxidizing agent	Quantity of oxidizing agent in moles added to 0.30 mols of the Compound (2)	ed ols Solvent	Reaction period (hr.)	Reaction temp.	Yield (based on compound (2), (%)	Product
	0 	NaIO,	0.33	MeOH(200ml)— H, O(200ml) CHCl,(300ml)	24	25	83	0   
	CH, CH, OH	NaIO,	0.33	MeOH(200ml)— H, O(200ml) CHCl, (300ml)	24	25	70 82	CH-CON  CH, CH, OH  CH, CH, OH
	0    -CNHCH, CH, 80, Na	Н2 02	0.50	MeOH(200ml)— H, O(200ml)	84	80	76	0    

TABLE 7 (Continued)

	Prep	aration of <i>B</i> -sulfi	TABLE nyl acrylic	TABLE 7 (Continued) Preparation of A-sulfinyl acrylic acids and esters and amides thereof	and amide	s thereof		
ä	Compound (2)	Oxidizing agent	Quantity of oxidizing agent in moles added to 0.30 mols of the Compound (2)	od ed Is Solvent	Reaction period (hr.)	Reaction temp.	Yield (based on compound (2), (%)	Product
CH,		Nai0,	0.33	MeOH(200m1)- H <sub>2</sub> O(200m1)	24	25	8.5	
	0=		0.50	EtOH(300ml)	48	80	70	0=
	-C-0H		0.33	CHC1,(300m1)	-	25	63	CH, SCH = CHCOOH
		СН, СОООН	0.30	AcOH(200ml)	1	-10	72	
	0=0	NaIO,	0.33	MeOH(200m1)— H <sub>2</sub> O(200m1)	24	25	. 91	
	-COMe	H,0,	0.50	EtOH(300ml)	48	08	84	
		15 No. 10	0.33	CHCl, (300ml)	-	25	89	O 
-		сн, сооон	0,30	AcOH(200ml)		-10	70	
	HOHO 0	NaIO,	0.33	MeOH(200ml)- H <sub>2</sub> O(200ml)	24	25	7.5	o=
		H2 02	0.50	EtOH(300ml)	48	80	63	CH, SCH = OHOH
								снсоосн,снсн,

		n d Product	O = CH, SCH =	CHCGOCH <sub>2</sub> OH	0             	СНСОО(СН, СН,0),Н	O CH, SCH =	снсоо(сн, сн,о), сн,
	•	Yield n (based on compound (2), (%)	72	. 63	7.3	56	08	83
	es thereof	Reaction temp.	25	80	25	80	25	25
	sandamid	Reaction period (hr.)	24	48	24	48	24	1
TABLE 7 (Continued)	c acids and ester	of led ols Solvent	MeOH(200ml) H <sub>2</sub> O(200ml)	EtOH(300ml)	MeOH(200ml)— H <sub>2</sub> O(200ml)	EtOH(300ml)	MeOH(200ml)— H <sub>2</sub> O(200ml)	CHCI, (300ml)
TABLE	finyl acryli	Quantity of oxidizing agent in moles added to 0.30 mol Co of the Compound (2)	0.33	0.50	0.33	0.50	0.33	0.33
	Preparation of A-sulfinyl acrylic acids and esters and amides thereof	Oxidizing agent	NaľO,	, 1,0,4	NaIO.	H,0,	NaIO,	H0000-
		Compound (2) X:	-ω-α-ου-	**************************************	0    -CO(CH <sub>2</sub> CH <sub>2</sub> O), H		0    	
		. <del>.</del>						

TABLE 7 (Continued)

	0=0	CH, CH, OH	CH, SCH = CHCONHCH, CH, SO, Na		O = 0	CHCOOH	
	89	75	73	85	70	63	72
s thereof	25	25	08	25	80	25	01-1
and amide	24	7	<b>8</b>	24	48	-	-
s acids and esters	MeOH(200ml)— H <sub>2</sub> O(200ml)	CHCI, (300ml)	MeOH(200ml)— H <sub>2</sub> O(200ml)	MeOH(200m1)— H <sub>2</sub> O(200m1)	EtOH(300m1)	CHC1, (300m1)	AcOH(200ml)
yl acrylic	0.33	0.33	0.50	0.33	0.50	0.33	0.30
Preparation of $oldsymbol{eta}$ -sulfinyl acrylic acids and esters and amides thereof	NaIO.	H0 000-{O}	H <sub>2</sub> O <sub>2</sub>	NaIO,	H <sub>2</sub> O <sub>2</sub>	HO 000	СН, СОООН
	O CH, CH, OH	сн, сн, он	0    -CNHCH, CH, 80, Na	,	O = OH		
				C <sub>20</sub> H <sub>41</sub>			

TABLE 7 (Continued)

Preparation of  $oldsymbol{eta}$ -sulfinyl acrylic acids and esters and amides thereof

Compound (2) R: X:	Oxidizing agent	Quantity of oxidizing agent in moles added to 0.30 mols of the Compound (2)	f id Solvent	Reaction period (hr.)	Reaction temp.	Yield Reaction Reaction (based on period temp. compound (hr.) (°C) (2), (%)	Product
0=	NaIO,	0.33	MeOH(200ml)— H <sub>2</sub> O(200ml)	24	25	76	
-coch,	н,0,	0.50	EtOH(300ml)	48	08	49	0=0
	#000 (O)	0.33	CHC1, (300ml)	-	25	70	CHCOOCH,
	СН, СОООН	0.30	AcOH(200ml)	1	-10	89	
HOHO 0	NaIO,	0.33	MeOH(200m1)- H <sub>2</sub> O(200m1)	24	25	7.5	0=5
	H, 0,	0.50	EtOH(300ml)	48	80	9	C20 A41 SCA =
							н   СНСООСН.СН—СН.

TABLE 7 (Continued)

	Pre	TABLE 7 (Continued) Preparation of $oldsymbol{eta}$ -sulfinyl acrylic acids and esters and amides thereof	TABLE nyl acrylic	TABLE 7 (Continued) acrylic acids and esters	and amide	s thereof		
ä	Compound (2) X:	Oxidizing agent	Quantity of oxidizing agent in moles added to 0.30 mols of the Compound (2)	of	Reaction period (hr.)	Reaction temp.	Yield (based on compound (2), (%)	Product
		NaiO,	0.33	MeOH(200ml)— H <sub>2</sub> O(200ml)	24	25	89	0 
	ੁਰ ਰ ਰ	H, 0,	0.50	EtOH(300 ml)	84	80	09	но но он
	0     -CO(CH, CH,0),H	NaIO,	0.33	MeOH(200ml)— H <sub>2</sub> O (200ml)	24	25	72	O = C.,H., SCH.=
	•	H <sub>2</sub> O <sub>2</sub>	0.50	EtOH(300ml)	48	80	55	СНСОО(СН, СН,0),Н
	0    	NaIO,	0.33	MeOH(200ml)— H <sub>2</sub> O(200m)	24	25	80	O == 0.00
		H0 000	0.33	CHCl <sub>3</sub> (300ml)	1	25	89	CHCOO(CH, CH,0), CH,

			TABLE	TABLE 7 (Continued)				
	Pı	Preparation of $oldsymbol{eta}$ -sulfinyl acrylic acids and esters and amides thereof	finyl acrylic	acids and ester	s and amide	s thereof		
ä	Compound (2) X:	Oxidizing agent	Quantity of oxidizing agent in moles added to 0.30 mols of the Compound (2)	ed 18 Solvent	Reaction period (hr.)	Reaction temp.	Yield (based on compound (2), (%)	Product
	0 СН, СН, ОН	Na10,	0.33	MeOH(200ml)— H <sub>2</sub> O(200ml)	24	25	70	0 
	сн, сн, он	сі 🔾 — соо он	0.33	CHCl <sub>3</sub> (300ml)		25	82 C	CHCON CH, CH, OH
	0 ∥ CNHCH2 CH2 SO3.Na	H, 0,	0.50	McOH(200ml)— H <sub>2</sub> O(200ml)	48	80	73 C	0
Oleyl (C <sub>16</sub> H <sub>35</sub> )	•	NaIO.	0.33	MeOH(200ml)— H <sub>2</sub> O(200ml)	24	25	80	0          SCH =
	-С-ОН	H, O,	0.50	EtOH(300ml)	48	80	99	СНСООН
		H0 000 (O)	0.33	CHCI, (300ml)	-	25	63	
		сн, сооон	0.30	AcOH(200ml)	<b>-</b>	-10	70	

TABLE 7 (Continued)

									E .		
		Product	O = C, H, SCH=	снсоосн,			0=0	онон 	0 = 3	ō \ ⟨	HQ PH
		Yield (based on compound (2), (%)	83	62	53	63	73	48 CH	72	63	
•	es thereof	Reaction temp.	25	80	25	-10	25	80	25	08	
	and amide	Reaction period (hr.)	24	48		1	24	84	24	84	
TABLE 7 (Continued)	acids and esters	ed ils Solvent	McOH(200ml)— H <sub>2</sub> O(200ml)	EtO!1(300ml)	CHC1, (300m1)	AcOH(200ml)	MeOH(200ml)— H <sub>2</sub> O(200ml)	EtOH(300ml)	MeOH(200m1)— H <sub>2</sub> O(200m1)	EtOH(300ml)	
TABLE	nyl acrylic	Quantity of oxidizing agent in moles added to 0.30 mols of the Compound (2)	0.33	0.50	0.33	0.30	0.33	0.50	0.33	0.50	
	Preparation of \(\beta\)-sulfinyl actylic acids and esters and amides thereof	Oxidizing agent	NaIO,	H <sub>2</sub> O <sub>2</sub>	#0 000 <b>(</b>	СН, СОООН	NaIO.	Н, О,	NaIO.	H <sub>2</sub> O <sub>2</sub>	
		Compound (2) X:	-COMe				о              -сосн,снсн,		0-8-	ਣ  -   -   -   -   -   -   -   -   -	
		.Ω									

TABLE 7 (Continued)

	Preparatio	of <i>\beta</i> -sulfinyl e	ıcrylic acid	Preparation of $eta$ -sulfinyl acrylic acids and esters and amides thereof	amides the	reof		
ä	Compound (2) X:	Oxidizing agent	Quantity of oxidizing agent in moles added to 0.30 mols of the Compound (2)	d s Solvent	Reaction period (hr.)	Reaction temp.	Yield (based on compound (2), (%)	Product
D.	0   	NalO,	0.33	MeOH(200ml)— H <sub>2</sub> O(200ml)	24	25	83	O = 0.6 H <sub>35</sub> SCH=
		Н, О,	0.50	EtOH(300ml)	48	80	70	СНСОО(СН, СН, О), Н
	0 H) H) O)	NaIO,	0.33	MeOH(200ml) H <sub>2</sub> O(200ml)	24	25	63	C. H. CCH
	00,012,012,012,010	CI (O)-000 0H	0.33	CHC!, (300ml)	-1	25	70	CHCOO(CH, CH, O), Me
	O CH, CH, OH	NaIO,	0.33	MeOH(200ml)— H <sub>2</sub> O(200ml)	. 24	25	72	0 
	Сн, сн, он	15 15 15 15 15 15 15 15 15 15 15 15 15 1	0.33	CHCl,(300ml)	-	25	99	CHCON CH, CH, OH

	Yield (based on compound (2), (%) Product	0       C <sub>10</sub> H <sub>35</sub> SCH = CHCONHCH <sub>2</sub> CH <sub>2</sub> SO <sub>3</sub> Na	63 0            PhSCH =	70 СНСООН	82	65	82 O	62 СНСООСН,
s thereof	Reaction (temp. c	08	25	80	25	-10	25	80
and amide	Reaction period (hr.)	84	24	8	<b>T</b>	1	24	84
TABLE 7 (Continued)	Solvent	MeOH(200ml) — H, O(200ml)	MeOH'200ml)— H <sub>2</sub> O(200ml)	EtOH(300ml)	CHČÍ, (300ml)	AcOH(200ml)	MeOH(200ml)— H <sub>2</sub> O(200ml)	EtOH(300ml)
TABLE 7	Quantity of oxidizing agent in moles added of the Compound (2)	0.50	0.33	0.50	0.33	0:30	0.33 h	0.50
TABLE 7 (Continued) Preparation of $eta$ -sulfinyl acrylic acids and esters and amides thereof	Oxidizing agent	Н, О,	NaIO	H,02	#0 000 O	СН, СОООН	NaíO,	H,0,
	Compound (2) R: X:	O     -CNHCH2 CH2 SO3Na	Ph (	0 - COH			O    	

TABLE 7 (Continued)

d	Preparation of $eta$ -acrylic acids and esters and amides thereof	lic acids ar	nd esters and ami	des thereo			
Compound (2) R: X:	Oxidizing agent	Quantity of oxidizing agent in moles added to 0.30 moles of the Compound (2)	f ed les Solvent	Reaction period (hr.)	Reaction temp.	Yield Reaction (based on temp. compound (°C) (2), (%)	Product
	200 OB - CO OB OH	0.33	CHCl <sub>3</sub> (300:nl)	<del></del> -	25	85	
	СН, СОООН	0.30	AcOH(200ml)	1	-10	70	
0 OHOH         -C0CH <sub>2</sub> -CHCH <sub>2</sub>	Na10,	0.33	MeOH(200ml)— H <sub>2</sub> O(200ml)	24	25	9/	0    PaSCH≈
	Н,0,	0.50	EtOH(300m!)	84	80	48	онон     Снсоосн, снсн,
0	Nai0,	0.33	MeOH(200ml) – H <sub>2</sub> O(200ml)	24	25	89	0 PhSCH ≈
₹ ₹ ₹ ₹ 8-	т° о²н	0.50	EtOH(300ml)	84	80	52	CHCCOCH <sub>2</sub>

			TABLE	TABLE 7 (Continued)				
	Prep	Preparation of $oldsymbol{eta}$ -acrylic acids and esters and amides thereof	lic acids an	d esters and ami	des thereof			
ä	Compound (2)	Oxidizing agent	Quantity of oxidizing agent in moles added to 0.30 moles of the Compound	f ed les Solvent	Reaction period (hr.)	Reaction temp.	Yield (based on compound (2), (%)	n 1 Product
	о    -со(сн, сн, о), н	NaIO,	0.33	MeOH(200ml)— H <sub>2</sub> O(200ml)	24	25	73	o ∥ PhSCH=
		H, 0,	0.50	EtOH(300ml)	48 ·	08	61	СНСОО(СН, СН,0), Н
	0   	NafO,	0.33	MeOH(200ml)— H <sub>2</sub> O(200ml)	. 24.	25	70	0 <del>-</del> 2
		H0 080	0.33	CHCI, (300ml)	1	25	4	СНСОО(СН, СН, О), Ме
	О СН, СН, ОН ——————————————————————————————————	NaIO,	0.33	MeOH(200ml)— H <sub>2</sub> O(200ml)	24	25	73	0    PhSCH ==
	,CH, CH, OH	#0 000 (O)	0.33	CHCI, (300ml)		2.5	75 (	CHCON CH, CH, OH

TABLE 7 (Continued)

Preparation of etaacrylic acids and esters and amides thereof

Compound (2) X:	Oxidizing Agent	oxidizing agent in moles added to 0.30 mols of the Compound (2)	Solven	Reaction period (hr.)	Reaction temp.	Yield Reaction Reaction (based on period temp. compound t (hr.) (°C) (2), (%)	Product
o    -CNHCH, CH, SO, Na	H³ 0³	0.50	MeOH(200ml)— H <sub>2</sub> O(200ml)	84	80	0,	PhSCH=

TABLE 8: PRO	PERTIES OF $eta$ -SUI	FINYL-ACRYLIC A	TABLE $8:$ PROPERTIES OF $oldsymbol{eta}$ -SULFINYL-ACRYLIC ACIDS AND ESTERS AND AMIDES THEREOF	ES THEREO!	ſr.		
COMPOUND	PROPERTY	IR (cm ~)	NMR (CCI,, TMS, ppm)	Result fou C (%)	found (%)	Result of elementary analysis found calcd. C (%) H (%) C (%) M (%)	v analysis calcd. N (%)
0 .    C <sub>12</sub> H <sub>28</sub> S—CH=CH—COOH	m.p. 62 – 65°C (from hexane)	3300 (OH)	7.25 (doublet, 1H, -CH-C00	62.4	7.3	62.5	4.5
		0 # 1690 (—CO—)	6.50 (doublet, 1H,				
		0 	0     -SCH=)				
0=	d.m	0     1710 (-C-0-)	7.20 (doublet, 1H, -CH-COO-)	62.3 10.1	10.1	62.0	10.4
C <sub>12</sub> H <sub>26</sub> -S-CH= CH-COOCH <sub>3</sub>	(from hexane)	0    	6.52 (doublet, 1H,				
			0     -S-CH*)				
O OH OH 	Liquid	3300 (OH) 0   0   1715 (-C-O-)	7.58 (doublet, 1H, -CH-C00-)	62.3	9.5	62.4	9.9
		0    1050 (-S-)	5.60 (doublet, 1H,				
			0 == -S-CH-)				

							_
COMPOUND	PROPERTY	IR (cm <sup>-1</sup> )	NMR (CC1, TMS, ppm)	Result of elementary analysis found calcd. C (%) H (%) C (%) H (%)	lementary c %) C (%	analysis alcd. ) H (%)	
т. 33 (fr) (fr) (fr) (fr) (fr) (fr) (fr) (fr)	m.p. 33 – 35°C (from isopropyl alcohol)	3300 (OH)    0     1713 (-CO-)   0       1035 (-S-)	7.60 (doublet, 1H, -CH-COO)  O  II  5.30 (doublet, 1H, -S-CH=)	57.6 8.3	3 58.0	∞ ∞	
0 0         C1,1H,1,6-S-CH-C11-CO(CH,CH,0),H    L.i	pinp	3300 (OH)    1715 (-CO-)	7.33 (doublet, 1H, -CH-COO-) 59.8  1 6.65 (doublet, 1H, -S-CH-)	59.8 9.3	3 60.0	9.6	1,557,225
0 0 0    C,1,4,1, -S-CH=CH-CN(CH,CH,OH), Li	Liquid	3300 (OH)	6.95 (doublet, 1H, =CH-COO-) 59.5  0		9.6 60.8	10.0	
m. 12 12 12 17 18 19 10 10 10 10 10 11 12 12 13 14 15 15 16 17 18 18 18 18 18 18 18 18 18 18 18 18 18	m.p. 120 – 123°C (from isopropyl alcohol) 1225,	0     1625 (-CN-)     1035 (-S-) 1060 (-SO <sub>3</sub> Na)	6.80 (doublet, 1H, -CH-COO-) 50.3  O II 5.90 (doublet, 1H, -S-CH- in CD, OD	50.3 7.6	5 50.6	8.0	3

COMPOUND	PROPERTY	IR (cm <sup>-1</sup> )	NMR (CCI, TMS, ppm)	Result fou	Result of elementary analysis found calcd. C (%) H (%) C (%) H (%)	entary 8 C C (%)	calcd.
0=	Liquid	3300 (OH) 0	7.25 (doublet, 1H, -CH=COO-)	35.7	4.4	35.8	4.5
сн, зсн-сисоон		1690 (-CO-)	Oa				
		1050 (-S-)	5.50 (doublet, 1H, -S-CH=)				
0=		o=					
CH,SCH=CHC00CH,	Liquid	1713 (-CO-)	7.30 (doublet, 1H, -CH-COO-)	40.7	5.4	40.5	5.4
		0=	O.=				
		1043 (—Š—)	6.10 (doublet, 1H, -S-CH=)				
		3300 (ОН)	7.25 (doublet, 1H, aCHaCOO-)	40.7	5.7	40.4	5.8
HOHO ==		o=	o=				
CH, SCH-CHCOCH, CHCH,	Liquid	1710 (-C-O-)	5.92 (doublet, 1H, -S-CH-)				
		<b>-</b>					
		1040 ()					
		3300 (ОН)	7.30 (doublet, 1H, ~CH-COO-)	42.6	5.8	42.9	5.8
. 0		0=					
сн <sub>3</sub> šcн-сн°осн <sub>2</sub>	Liquid	1715 (-C-0-)	0=				
₹ }-8 `9		0=	11 6.10 (doublet, 1H, -S-CH-)				
		1030 (—S—)					

TABLE 8: PROPE	RTIES OF B-SULFIN	L-ACRYLIC ACID	TABLE 8: PROPERTIES OF $eta$ -SULFINYL-ACRYLIC ACIDS AND ESTERS AND AMIDES THEREOF ( ${\sf cont.}$ )	REOF (cont.)		
COMPOUND	PROPERTY	IR (cm <sup>-1</sup> )	NMR (CCI <sub>4</sub> , TMS, ppm)	Result of elementary analysis found calcd.	ementar b) C (9	calcd. Calcd. C (%) H (%)
. 0		3300 (ОН)	7.11 (doublet, 1H, ~CH-COO-)	45.3 6.7	45.1	8.9
CH,SCH=CHCO(CH,CH,O),H	Liquid	1710 (-CO-)	0=			
		0=	5.93 (doublet, 1H,S-CH=)			
		1040 (-S-)				
		3300 (OH)	7.21 (doublet, 1H, "CH-C00-)	43.8 6.7	43.4	8.9
O O O	Pinui 1	0 	0=			
		0=	5.93 (doublet, 1H, -S-CH-)			
		1045 (-S-)				
		0=	7.12 (doublet, 1H, "CH"COO-)	28.6 3.8	28.9	4.0
	m.p. 110–111°C	1625 (-CN-)				
Cn, oca-cn-cnach, cn, ou, na	alcohol)	0=	0=			
		1040 (-S-)	6.20 (doublet, 1H, -S-CH")			
		(-S0,Na)	in CD <sub>3</sub> OD			
		3300 (OH)	7.25 (doublet, 1H, "CH-COO-)	69.1 11.1	0.69	11:1
0==	m.p. 80 – 81°C	o==				
C20H41SCH-CHCOOH	(from hexane)	1685 ( <u>~</u> CO_)	0=			
		0=	5.55 (doublet, 1H, -S-CH=)			
		1050 ( <del>-</del> S-)	1			

TABLE 8: PROPERTIES		L-ACRYLIC ACID	OF $eta$ -SULFINYL-ACRYLIC ACIDS AND ESTERS AND AMIDES THEREOF ( ${ t cont.}$ )	REOF (co.	nt.)			35
COMPOUND	PROPERTY	IR (cm <sup>-1</sup> )	NMR (CCI,, TMS, ppm)	Result of elementary analysis found calcd.  C (%) H (%) C (%) H (%)	of eleme I cs H (%)	mentary ar calcd. C (%)	nalysis H (%)	
		3300 (OH)	7.32 (doublet, 1H, -CH-COO-)	66.3	10.8	66.5	10.9	
C, II, SCII-CHN(CH, CH, OH),	m.p. 40-41°C (from hexane)	0    1645 (–CN)	0     6.11 (doublet, 1H, -S-CH=)					
		0    1040 (-S-)						
0=	m.p.	0    1620 (-CN-) .	7.03 (doublet, 1H, =CH=COO-)	58.4	6.3	58.3	9.3	1
C,0H,1SCH=CHCNHCH,CH,SO,Na	(from isopropyl.	0 1035 (-\$-)	0    5,92 (doublet, 1H, -SCH=)					,557,225
	1225,	1225, 1050 (-SO <sub>3</sub> Na)	in CD <sub>3</sub> OD					
0:	m•p•	3300 (OH)	7.30 (doublet, 1H, -CH-COO-) 68.2		10.3	68.1	10.3	
C,0H,5SCH=CHCOOH	70–71°C (from hexane)	1680 (-CO-)	5.56 (doublet, 1H, -S-CH=)					
		1040 (-S-)						
0     C.H SCH-CHCOOCH,	m.p. 73–74°C	0 1710 (-C-0-)	7,12 (doublet, 1H, =CH-COO-)	68.9	10.5	68.7	10.5	
	(from hexane)	0     1043 (-S-)	0    6.24 (doublet, 1H,S-CH=)					· · · · · · · · · · · · · · · · · · ·

TABLE 8: PROPERTIES		L-ACRYLIC ACID	OF $eta$ -SULFINYL-ACRYLIC ACIDS AND ESTERS AND AMIDES THEREOF (cont.)	REOF (cor	<u> </u>			36
COMPOUND	PROPERTY	IR (cm-¹)	NMR (CCI,, TMS, ppm)	Result of elementary analysis found calcd.	f eleme nd H (%)	entary analysis calcd. C (%) H (%)	nalysis cd. H (%)	
ноно о	m.p.	3300 (OH)	7.11 (doublet, 1H, -CH-COO-)	64.9	10.2	64.8	10.0	
C,h,, SCH-CHCOOCH, CHCH,	(from hexane)	1710 (-C00-)	0=					
		II 1040 (-S-)	5.75 (doublet, 1H, -S-CH-)					
	5	3300 (OH)	7 30 (doublet 14 -CH-COO )	0 67	7 0	2 5	.	
C <sub>B</sub> H <sub>35</sub> ScH=CHC00CH <sub>2</sub>	55–56°C (from hexane)	1715 (-C00-)	0	e• /o	o. 7	/-/0		
\$ \$		1020 (—S—)	6.11 (doublet, 1H, -3-CH-)					1
0=	m.p.	3300 (OH)	, 900 ID III +-In-P/ 30 F					557ر
C1,84,5 SCH-CHCOO(CH,CH,O),H	(from hexane)	1710(-C00-)	(-000-00-) (7.7) (monoiet, 1n, -00-00-)	04./	10.1	04.0	10.0	,225
		1040 (—S—)	5.98 (doublet, 1H, -S-CH=)					
0=		3300 (OH) O	7.21 (doublet, 1H, -CH-COO-)	70.8	4.2	70.3	4.0	
C,H,,SCH=CHCN(CH,CH,OH),	38–39°C (from hexane)	1640 (-CN-)	<b>○</b> ≈					
		1030 (-S-)	6.03 (doublet, 1H, -S-CH=)					
0==	m.p. 121–122°C	1625 (-CON-) Q	7.22 (doublet, 1H, "CH=COO-)	56.6	8.3	56.9	8.6	
C,,H,,SCH-CHCNHCH,CH,SO,Na	(isopropyl alcohol)	1038 (S)	5.93 (doublet, 1H;,-S-CH-)			ī		
		1225, 1040 (-SO <sub>3</sub> Na)	in CD,OD					3

(cont)
<b>CHEREOF</b>
AMIDES 7
AND
<b>ESTERS</b>
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IABLE 8: FRO	FERTIES OF B-SULFIN	Y L-ACKY LIC ACIL	TABLE OF FROFERIES OF B-SULFINYL-ACKYLIC ACIDS AND ESTERS AND AMIDES THEREOF (cont.)	REOF (co	ır)		
COMPOUND	PROPERTY	IR (cm *¹)	NMR (CCI <sub>4</sub> , TMS, ppm)	Result of el found C (%) H (9	of elemund und H (%)	Result of elementary analysis found calcd. C (%) H (%) C (%) H (%)	analysis calcd.
O    PhSCH-CHCOOH	m.p. 88–89°C (from hexane)	3300 (OH) 1690 (COO) 0 11035 (-S-)	7.30 (doublet, 1H, -CH-COO-) 0	55.3	4.2	55.1	4.1
0    Phsch-chcooch,	m.p. 80–81°C (from hexane)	1710 (COO-) 0 0 1040 (-S-)	7.22 (doublet, 1H, -CH-COO-)	57.3	4.6	57.1	8.4
0 0 0нон 1 1 1 1 Ръѕсн-снсоосн,снсн,	liquid	3300 (OH) 1715 (-C00-) 0 1035 (-S-)	7.10 (doublet, 1H, =CH-COO-)  O  S.65 (doublet, 1H, -S-CH=)	53.4	5.2	53.3	5.2
Pho HO HO HO HOS HA	liquid	3300 (OH) 1710 (-COO-) 0 1030 (-S-)	7.25 (doublet, 1H, -CH-COO-)  0  6.01 (doublet, 1H, -S-CH=)	8.65	5.30	52.6	5,30
о ∥ РьЅсн-снсоо(сн,сн,о),н	liguid -	3300 (OH) 1710 (-COO-) 0 1038 (-S-)	7.30 (doublet, 1H, -CH-COO-) 0 5.88 (doublet, 1H, -S-CH-)	54.6	6.1	54.9	6.1

TABLE 8: PROPERTIES OF eta-SULFINYL-ACRYLIC ACIDS AND ESTERS AND AMIDES THEREOF (cont.)

				Result	of elem	Result of elementary analysis	alysis
COMPOUND	PROPERTY	IR (cm "1)	(CCI₄, TMS, ppm)	(%)	(%) H (%)	C (%) H (%) C (%) H (%)	calcd.
0=		3300 (OH)	7.20 (doublet, 1H, =CH-COO-) 55.0 6.2 55.1	55.0	6.2	55.1	6.1
PhSCH CHCON(CH2CH2OH)2	Liquid	1635 (-CN-)	0=				
		0=	6.13 (doublet, 1H, -S-CH-)				
		1038 (-S-)					
0=		1630 (-CON-)					ĺ
PhSCH-CHCONHCH, CH, SO, Na		0=	7.24 (doublet, 1H, -CH-COO-) 42.3	42.3	3.8	42.4	3.9
		1038 (-S-)	O≈				
		1225, 1040 (-SO <sub>3</sub> Na)	5.84 (doublet, 1H, -S-CH=) in CD,0D				
			,				

Example 6.

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15 This Example shows the antibiotic activities and the growth preventing effects of the compounds against gram positive and gram negative micro-organisms.

In accordance with the test method using agar culture media mixed with the compounds, the concentrations of the compounds of the present invention necessary for preventing growth of various organisms were determined.

I ml of a solution of each of the compounds having predetermined concentration as set forth in the following Tables was put on a Petri dish, and 19 ml of Sabouraud's agar culture medium preliminarily heated to a molten state was then added to and uniformly mixed with the above solution, and the mixture was allowed to cool and solidify. One platinum loop of a suspension containing one million cells of an organism per 1 ml was coated on the surface of the culture medium, and was cultivated for 72 hours in a thermostatic chamber maintained at 30°C. The state of growth of the organism on each culture medium after this cultivation was observed, and the minimum concentration of the respective compounds for preventing growth of the 15

organism on the culture medium was determined.

The reference symbols appearing in the following Tables have the meanings set forth hereinbelow:

+: Growth was observed; a growth preventing effect was not exhibited.

±: Growth was observed to some extent; an appreciable growth preventing effect was observed.

-: Growth was not observed; a perfect growth preventing effect was exhibited.

	Organism Species	Stapiny	stapity tococcus autous	anicas	2	Carrier Samuel	81118
Compounds of the Invention	Concentration of compounds (PPM)	1000	200	100	1000	200	100
n-c,H,-S-CH-CHCON(CH,CH,OH),		:	!	ι	ı	ı	+1
n-C,H, CON(CH, CH2OH),		:	+	+	ı	+	+
Reference Compound			1				
HO HO HO COON		ì	+	+	t	+	+
Reference Compound	·		!				
		1	•	•	ı	. +	+
HO-CO2C245				-		1	•
Reference Compound							

	Organism Species	Staphy	Staphylococcus aureus	aureus	Ba	Bacillus subtilis	ilis
Compounds of the Invention	Concentration of compounds (PPM)	500	100	50	200	100	50
0 n-C <sub>1,</sub> H <sub>2,6</sub> -S-CH-CH-COOH			1		1	1	'
0 			1	ı	1	ı	1
- HO		+	+	+	+	+	+
Reference Compound							
54₹3203-⟨Д							İ
Reference Compound		t	+	+	+1	+	+

Compounds of compounds (PPM) 500 100 50 500 100 50 C,H,G-S-CH-CH-COOCH,		Organism Species	Esch	Escherichia coli	coli	Pro	Proteus vulgaris	aris	Pseudor	Pseudomonsa aeruginosa	nginosa
	Compounds of the Invention	Concentration of compounds (PPM)	200	100	50	200	100	20	200	100	90
+ + + + + + + + + + + + + + + + + + +	0 n-C,H ,-S-CH-CH-COOCH,		1	ı	t	ı	1	١	1	+	+
+ + + 1	HO HO		<del>†</del>	+	+	+	+	+	+	+	+
+ + + + + + + + + + + + + + + + + + + +	Reference Compound										
Reference Compound	THE COLUMN TO SERVICE STATE OF THE SERVICE STATE OF THE SERVICE STATE STATE OF THE SERVICE STATE OF THE SERVICE STATE OF THE		+1	+	+	i	+	+	+	+	+
Reference Compound											
	Reference Compound										1

Compounds of the Invention	Constantanton			:	וסוג	Troices vergatis	2	lloppes 3	ionas aer	Pseudomonas aeruginosa
1000	compounds (PPM)	1000	200	100	1000	200	100	100 1000	200	100.
NOO.										
		+	+	+	+	+	+	+	+	+
Reference Compound										
SPS-SS-SS-SS-SS-SS-SS-SS-SS-SS-SS-SS-SS-		ı	. +1	+	ſ	ı	+	+1	+	+
Reference Compound										

	Organism Species	Stapnylococcus aureus		Bacillus	<b>(</b> 0	Esch <b>e</b> richia coli	cnia	vulgaris	ris	aeruginosa	r seudomonas aeruginosa
Compounds of the Invention	Concentration of compounds (PPM)	1000 500 100 1000 500 100 1000 500 100 1	100 1000	200	100	1000 500	100	1000 500	100	1000 5	00 1(
DMOOO											
₩.		+	+	+	+	++	+	++1	+	+	+
Reference Compound											
					-						
514202020—€		t t	+	+1	+	+1 1	+	· .	+	+:	•
Reference Compound											

	Organism Species	Stap	Staphy lococcus aureus	ccns	· ·	Bacillus subtilis	S	Esc	Escherichia coli	ia	Q. 5	Proteus vulgaris	S S	Pse	Pseudomonas aeruginosa	nas
Compounds of the Invention	Concentration of compounds (PPM)	200	8	50	200	100	20	200	100	20	200	100	20	500	100	50
O CH,-S-CH-CH-COOCH,		+	+	+	+	+	+	+	+	+	+	+	+			+
o P-C,H,−S-CH-CH-COOCH,		+1	+	+	++	+	+	++	+	+	+1	+	+	1	+	+
o n-C,H,−S-CH-CH-COOCH,			+	+	. 1	+	+		+	+	,	+	+		+	+
0 n-C,H,⊸S-CH-CH-COOCH,		   	,	,				ı	1	ı			ı	. 1	+	+
0 n-C₅H₁, S-CH-CH -COOCH,		,				ı			+	+	ı			+1	+	+
n-C,H,,-S-CH-CH-COOCH,	-	1		1		,			+	+				+1	+	+
0 n-C,H,,-S-CH-CH-COOCH,			1	1	1		1	+1	+	+	.	+	+	+	+	+
n-C,u,,S-CH-CH-COOCH,		10		1		1		+1	+	+	ı	+	+	+	+	+

Compounds of compounds (PPM) 500 100 50 500 100 50 500 100 50 500 100 50 600		Organism Species	Staphy aureus	Staphy lococcus aureus	occus	B	Bacillus subtilis	<b>m</b>	Esch coli	Escherichia coli	i.a	<u> </u>	Proteus vulgaris	w <u>w</u>	Psel	Pseudomonas aeruginosa	nas
+       +	Compounds of	Concentration of compounds (PPM)	200	100		1		1	200	100	50	200	100	20	200	100	20
+ + + + + + + + + + + + + + + + + + +	о .   . .   . 		i	,	,			,		+:	+	+1	+	+	+	+	+
+       +	0   		ı				ι	ı	+	+	+	+	+	+	+	+	+
+       +       +         +       +       +	0    		ı	1	,	ı	ı	t	+	+	+	+	+	+	+	+	+
+ + + + + + + + + + + + + + + + + + +	C,H,,-S-CH-CH-COOCH,		ı	,	<del>,+</del> 1	,	,	+	+	+	+	+	+	+	+	+ .	+
+ + + + + + + + + + + + + + + + + + + +	HO COOM		+	+	+	+	+	+	+	+	÷	+	+	+	. +	+	+
+ + + + + + + + + + + + + + + + + + +	eference Compound																
eference Compound			1	-	+	+1	+	+	+1	+	+	ı	+	+	+	+	+
	eference Compound				-		ļ										

	Organism Species	Staphy aureus	Staphy lococcus aureus	occut		Bacillus subtilis	co.	Escl coli	Escherichia coli	hia	<b>**</b> >	Proteus vulgaris	S	Pse	Pseudomonas aeruginosa	nas
Compounds of the Invention	Concentration of compounds (PPM)	200	100	50	200	100	20	200	100	05	200	100	50	200	100	50
0    n-C,H ,~S_CH~CH—COOH			+	+	1	+	+	+	+	+	+	+	+	+	+	+
0 n-C,H,-S-CH-CH-COONa		ı	+	+		+	+	+	+	+	+	4	+	+	+	+
0    		ı	t	ı	1	1	i	1	ī	1	,	1	,	1	+	+
n-C,H,-S-CH-CH COO(CH,CH,O),CH,	),сн,		ı	1	,	,			+	+	1		+	+	+	+
0 0 n-C,H ,-S-CH=CH-COOCH,CHCH,OH	нон	ι	ı	ı	,	i	1		ı	+		,	+	+1	+	+
n-C449-5-CH-CH-C00-CH2 OH		I	ı	ı	t	ı	1	ı	+1	+	1	+1	+	+	+	+
n-C,H,-S-CH-CH-C00(CH,CH,O),0H	H <sub>0</sub> ,((		1	1	ŧ	ι	ι	ı	1	+		+1	+	+1	+	+

	Organism Species	Staphyl aureus	Staphylococcus aureus	snoo	Bacillus subtilis	lus Iis	Esch coli	Escherichia coli	-E	<u> </u>	Proteus vulgaris	so so	Pseu	Pseudomonas aeruginosa	nas
Compounds of the Invention	Concentration of compounds (PPM)	200	100 5	50 500	0 100	50	200	500 100	50	500 100	100	20	500 100	100	52
n-C4hg-S-CH=CH-COOCH2 0 0 C-CH3		t	ı	-	l	1	. 1	+	+	ı	+	+	+	+	+
\$ 1000 ANOTO		4			1	•	•	+	+	+	+	•	•		-
Reference Compound		+	+	+	<b>+</b>	٠	٠	+	Þ	•	•	-	-	•	•
HO CO26245		1	+	+	+	+	+1	+	+	1	<b>+</b>	+	+	+	+
Note that the state of the stat			}			İ									

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	Organism Species:	Staphyl aureus	Staphy lococcus aureus		Bacillus subtilis	<b>_</b>	Esche	Escherichia coli		Proteus vulgaris	us ris	Ps	Pseudomonas aeruginosa	onas sa
Compounds	Concentration of compound (ppm)	1000 500	00 100	1000	500	100	1000 500	001 00	3	1000 500	100		1000 500	100
n-C,H g-S-CH-CH-CON(CH,CH,OH),	OH),		1	'	1			+1	,	1	+	1	+	+
n-C,H,,-S-CH-CHCON(CH,CH,OH),	)H),	;	1		,	+1	+	†	1	+	+	+	+	+
n-C,H,,-S-CH-CHCON(CH,CH,OH),	)H),	1		ı	,	+	+		+1	+	+	+	+	+
n-C <sub>10</sub> H <sub>3,1</sub> —S—CH-CH—CON(CH, CH, OH) <sub>2</sub>	''он),	'	'	١.	+	+	++	+	+	+	+	+	1	+
n-C <sub>13</sub> H <sub>33</sub> -S-CH-CHCON(CH <sub>2</sub> CH <sub>2</sub> OH) <sub>2</sub>	)H),	1	ı		t		+	+	'	+	+	++	+	+
n-C,44, 5-S-CH=CHCON(CH,CH,OH),	. (НС	1	+	1	1	+ .	+	+	+	+	+	+	t	, +
0 	)H),	1	+	,	+	+	+	+	+	+	+	+	+	+
n-C,H,-S-CH-CH-CONH,		1	+	ı	+	+	++	+	++	+	+	+	+	+
HNOO-HO-HO W HO								-						

Compounds	Organism Species:	Staphylococcus aureus	coccus	Bacillus subtilis	lus Iis	Escherichia coli	ichia		Proteus vulgaris	s s	Pseudomonas aeruginosa	mona:
0:	Concentration of compound (ppm)	1000 500	100	1000 500	100	1000 500	001 00	1	1000 500	100	1000 500	00 100
n-C,H,-S-CH-CH-CONH,		l i	+	t t	+	i	+	î	+	+	+1	+
0												
0 CH, S-CH-CH-CON CH, CH,		1 .	ı	i I	ì	. 1	+	· I	i	+1	ı	+
n-C,H,-S-CH-CH-CON(CH,CH,OH),		1	· L	1	ı	1	+ +1	1	ı	+		+
0    		1	1	1	+	1	+	+1	+	+	+	+
n-C,H,-S-CH=CH-CONHCH,CH,SO,Na		ŧ	+	\$ #	+	+	+	+	+	+	+	+
n-C <sub>11</sub> H <sub>23</sub> CON(CH <sub>2</sub> CH <sub>2</sub> OH) <sub>2</sub> (Reference Compound)		+	+	+1 ·	+	+	+	+	+ .	+	+	+
COOMA OH (Reference Compound)		+	+	. <b>+</b>	+	+1	+	<b>+</b> I	+	+	+	+

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Staphylococcus Bacillus Organism Species: aureus subtilis	Concentration of compound (ppm) 1000 500 100 1000 500	1 1		Example 7.  This Example shows the test results of the growth preventing effects of various combounds according to the present invention against funcion and veass.	I ml of a solution of each of the compounds having a predetermined concentration as set forth in the following Table and 19 ml of Sabouraud's agar culture medium	prominently incace to a motical state were put into a retri disn of 9 cm in diameter which had been sterilized in an autoclave, and uniformly mixed with each other and then colidified to form a plate.	In accordance with the general procedure of the "Method of Testing Resistance against Moulding" prescribed in Japanese Industrial Standard (JIS) No. Z—2911, on each of the Sabouraud's culture media individually containing specific compounds	set forth in the Table below, there was coated one platinum loop of a suspension containing spores of Penicillium critrinum, Aspergillus niger or Trichophyton mentagrophytes or a suspension of Candida albicans which is a representative yeast. The organisms on the cultivation plates were cultivated for 5 days in a thermostatic	chamber maintained at 25°C. After the end of the cultivation period, the growth states of the fungi and yeasts were observed, and the minimum concentrations of the respective compounds necessary for preventing growth of each organism were obtained to determine the effects of the compounds.
Organi	Compounds	Q-00 <sub>2</sub> 0 <sub>2</sub> 41 <sub>5</sub>	(Reference Compound)	This Exa compounds ac	s 1 ml of a as set forth in	which had be	10 In according against Mould on each of the	set forth in the containing sports of a grophytes or a organisms on	chamber main states of the fi respective com 20 to determine th

Candida albicans	100 50	+	+	+1	+	+	+ + 1	1	
D E	200	+1	1 /	1	+ 3	+		r <sub>1</sub> ,	1
tes	90	+	+	+	+	+	1	1	4
Trichophyton mentagrophytes	100	+1	ı	ı	1	1	1	· .	ı
Trichementa	500	1	ı	ı	ı	'	1	ı î	ı
sn	90		+	+	+	+	+	+	4
Aspergillus niger	100	+	+	+	+	+	+	+	4
P. i.	200	+	+1	ı	1	ı	,	1	-
E	88	+	+	+	+	+	+	١	
Penicillium citrinum	100	+	+	+	+	+	1		
Per cit	900	+	ı	ı	ł	+	1	1	
Organism Species	Concentration of compounds (PPM)				·				
	Compounds of the Invention	O       CH,_S_CH-CH_COOCH,	n-C <sub>2</sub> H, -S-CH-CH-COOCH,	0    n-C,H,-S-CH-CH-COOCH,	0    n-C,H,-S+CH-CH-COOCH,	0      -C,H11-S-CH-CH-COOCH,	n-C,H,,-S-CH-CH-COOCH,	0 n-C <sub>6</sub> H <sub>1</sub> ,-S-CH=CH-COOCH,	0

	Organism Species	Pen	Penicillium citrinum		Asp	Aspergillus niger		Trich	Trichophyton mentagrophytes	5 2	Car	Candida	
	colordo menegro				0							I	į
Compounds of the Invention	Concentration of compounds (PPM)	200	100	20	200	100	20	200	100	50	200	100	50
0 n-C <sub>12</sub> H <sub>3</sub> , -S-CH-CH-COOCH,		+	+	+	+	+	+	l	t	+			1
n-C,H, 9-S-CH-CH-COOCH,		+	+	+	+	+	+	1	+1	+		1	+1
n-C,4H,,-S-CH-CH-COOCH,		+	+	+	+		+	1	+	+	ı	+	+
0                   		+	+	+	+	+	+	ı	+	+	+	+	+
Potassium sorbate		+	+	+	+	+	+.	,	+	+	+	+	+
(Reference Compound)			:										
Anhydrous sodium acetate		,	+	+	+	+	+	i	+	+	ı	+	+
(Reference Compound)													
									ı				

	Organism Species	Penicilli citrinum	Penicillium citrinum		Asper niger	Aspergillus niger		Trich	Trichophyton mentagrophytes	tes	al al	Candida albicans	
Compounds of the Invention	Concentration of compounds (PPM)	1000	200	<u>8</u>	1000	200	100	1000	200	100	1000 500 100 1000 500 100 1000 500 100 1	200	100
Potassium sorbate		+1	+	+	+1	+	+	,	-	+	+	+	+
(Reference Compound)													
Anhydrous sodium acetate		1		+	1	+	+		1.	+	1		+
(Reference Compound)													

7					1,557	,225		
	20	+	. 1	+	+	+	+	+
Candida albicans	100	+1	1	+1	+	+	+	+1
Ca ab	200			ŧ	1	•	+	'n
re s	50	+	ı	ı		+	+	+
Trichophyton mentagrophytes	100	+	-	ı	1	ı	+	1
Tricho menta	200	ı	•	ı		l		1
91	50	+	+	+	+	+	+	+
Aspergillus niger	100	+	+	1	1	+	+	+
Asper niger	200	+	ı	ı	ı	ı	.	1
Peni cillium citrinum	20	+	+	+	+	+	+	+
	100	+	+	+	1	+	+.	+
Pen	200	+	ı	ı	1	1	+1	ı
Organism Species	Concentration of compounds (PPM)			r.				
	Compounds of the Invention	0    	n-C,H,-S-CH=CH-COOCH,	0    n-C,H s-S-CH-CH-COO(CH,CH,O),CH,	0 он       0 n-C, н , - S – СН - СН – СООСН, СНСН, ОН	но но но но- сн-5-64/5-и	n-C,H,-S-CH-CH-COO(CH,CH,O),0H	о — с <sub>и</sub> чу-5-сн=сн-соо-сн <sub>2</sub> т — о — с <sub>и</sub> чу-5-сн <sub>3</sub> — сн <sub>3</sub> —

		Penicillium Organism Species citrinum	E	Asper	Aspergillus niger		Tricho	Trichophyton mentagrophytes	s e	Can	Candida albicans	
Compounds of the Invention		Concentration of compounds (PPM) 500 100	20	500	001	20	200	100	50	200	100	50
Potassium sorbate		+	+	+	+	+	ł	+	+	+	+	+
(Reference Compound)												
Anhydrous sodium acetate		+	+	+	+	+	1	+	+	ı	+	+
(Reference Compound)												į
		The compounds of the invention possess antimicrobial activity against one or more of bacteria, fungi and yeasts. They can be used as preservatives and antiseptics, in cosmetic oils, lotions and creams, and pharmaceutical oil, lotion and cream com-	ss antim be used	icrobial as pres ical oil,	activity ervative lotion	r again s and s	ist one antisept eam co	or ics				
<b>S</b>		antiseptics conventionally used in such compositions, at approximately the same	e used in nposition	n place 18, at 8	of the opproximate of s	preservanately odium	atives a the sa	를 해 다. 다.	S			
01		ethyl paraben, potassium sorbate and anhydrous sodium acetate, which are conventional preservatives, in prior art compositions that employ those conventional preservatives.	rous sod that em	ium ace	se conve	hich ar intional	e conv		10			
		WHAT WE CLAIM IS:— 1. A compound having the formula:										
		RSO—CH=CHX	=CHX									
	15	wherein R is alkyl or alkenyl having 1 to 20 carbon atoms, or a naryl group, and X is —COY, wherein Y is (1) —O(CH <sub>2</sub> CH <sub>2</sub> O) <sub>m</sub> H, wherein m is zero or an integer from 1 to 12, or (2) —OM, wherein M is an alkali metal, an alkaline earth metal	carbon O) <sub>m</sub> H, v	atoms, vherein i metal.	orana misza analk	ryl groi ero or aline ea	up, and an inte		15			
	•	or NH, or (3) -0(CH <sub>2</sub> CH <sub>3</sub> O) <sub>m</sub> R, wherein m is as defined above and R, is alkyl having one to 20 carbon atoms, or (4) a hydroxyl-substituted alkoxy group obtained	in m is droxyl-su	as defini ibstitute	ed abov d alkox	e and ] y grouf	R, is al	ed 3				
20	70	by removing one hydrogen atom from one hydroxyl group of a polyhydric aliphatic alcohol or a group of the formula	nydroxyl	group (	of a po	yhydrie	c alipha		20			
		Hoch CH2 CH3 CH3 CH3 CH3 CH3 CH3 CH3 CH3 CH3 CH3	6	٠ و ا	15-2450 15-2450	\$ -5-	5_5_5					
		, ch - ch2 - ch ch2				5	Ē					

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5	or (5) —NR'R", wherein R' is selected from hydrogen, alkyl having 1 to 20 carbon atoms, and hydroxyalkyl having 2 to 6 carbon atoms, and R" is selected from hydrogen, alkyl having 1 to 20 carbon atoms, and substituted alkyl having 2 to 6 carbon atoms wherein the substitutent is selected from hydroxyl and a sulfo group in the form of a salt (—SO <sub>3</sub> M <sub>1</sub> , wherein M <sub>1</sub> is an alkali metal).  2. A compound according to Claim 1, wherein R is a straight-chain alkyl or alkenyl group having 3 to 18 carbon atoms.  3. A compound according to Claim 1, wherein Y is a hydroxyl group or OM where M is an alkali metal.  4. A compound according to Claim 1 or Claim 2, wherein Y is selected from alkoxy having one to 3 carbon atoms, alkoxyethoxy having one to 3 carbon atoms in the alkyl moiety, and —O(CH <sub>2</sub> CH <sub>2</sub> O) <sub>2</sub> R', where R' is C <sub>1</sub> to C <sub>3</sub> alkyl,	5
	OН	
	-OCH <sub>2</sub> -CH <sub>2</sub> OH,	
15	and —O(CH <sub>2</sub> CH <sub>2</sub> O) <sub>m</sub> H (m=1 to 12).  5. A compound according to Claim 1 or Claim 2, wherein Y is —NR'NR".  6. A compound according to Claim 5, wherein R' is selected from hydrogen, alkyl having 1 to 3 carbon atoms, and hydroxyalkyl group having 2 or 3 carbon atoms, and R" is selected from hydrogen, alkyl having 1 to 3 carbon atoms, hydroxyalkyl having 2 or 3 carbon atoms, and substituted alleges.	15
20	alkyl having 2 or 3 carbon atoms, and substituted alkyl group having 2 or 3 carbon atoms and wherein the substituent is —SO <sub>3</sub> M wherein M is an alkali metal.  7. A method of preparing a compound as claimed in Claim 1, which comprises oxidizing a starting compound having the formula:	20
	RS—CH—CHX,	
25	wherein X is as defined in claim 1, with an inorganic or organic peroxide.  8. A method according to Claim 7, wherein said inorganic or organic peroxide is hydrogen peroxide, sodium metaperiodate, m-chloro-perbenzoic acid, perbenzoic acid, or peracetic acid.  9. A method according to Claim 8, wherein 1.1 to 1.5 moles of said inorganic or organic peroxide is used per 1 mole of said starting compound.	25
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Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1979.
Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.